

Species

Morphological characters and morphometric relationship of ribbonfish, *Lepturacanthus savala* (Cuvier, 1929) off Ratnagiri coast, Maharashtra

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ABSTRACT

Morphometric and meristic characters of *L. savala* of Ratnagiri coast have been studied and the relationships of morphometric characters with standard length were established. The fishes ranged between 250-700 mm. in total length. The morphometric equations for the samples collected along the Ratnagiri coast were TL = 14.081 + 0.984 SL, UO = 0.60 + 0.057 SL, YJ' = 2.176 + 0.124 SL, OO' = 0.528 + 0.01 SL, Eg = 0.283 + 0.005 SL, PDL = 1.175 + 0.905 SL, DD = - 0.529 + 0.892 SL, SVL = 4.535 + 0.335 SL, Ph = 1.093 + 0.092 SL, h = 0.533 + 0.074 SL. The meristic characters such as number of dorsal fin spine varied from 3-4 and the pyloric caecae were found from 15-16 numbers. Teeth in the main series in upper and lower jaw were 7-15.

Keywords: *L. savala*, morphometric characteristics, pyloric caecae

Key:

1. Total length (TL)
2. Standard length (SL)
3. Snout length (UO)
4. Head length (YJ')
5. Orbital diameter (OO')
6. Greatest pupil diameter (Eg)
7. Pre dorsal fin length (PDL)
8. Dorsal fin base length (DD)
9. Snout-vent length (SVL)
10. Pectoral fin length (Ph)
11. Body depth (h)

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1. INTRODUCTION

The ribbonfishes, also called the hair tails or cutlass fishes elsewhere, occupy an important place among the food fishes of India. The ribbonfish, *L. savala* belong to the Family-Trichiuridae, Order-Perciformes of Subclass Neopterygii and Class Actinopterygii (Cuvier, 1929). Ribbonfish is also called savali hair-tail or cutlass (Nair et al., 2003). This species is distinguished by very elongated and tapering caudal part, visible spine near the anus, small eyes with the diameter 7 to 9 times in head length, dorsal fin with 3 to 4 spines and 110 to 120 soft rays (Fischer et al., 1984). As *L. savala* is dominant species among trichiurid in the commercial catches of Ratnagiri. In the present paper an attempt has been made to define identification characteristic of *L. savala* of Ratnagiri region through morphometric and meristic characters.

2. MATERIALS AND METHODS

Fresh specimens of *L. savala* were collected randomly, at weekly intervals from Mirkarwada landing centre of Ratnagiri from February 2012 to February 2013 for present study. Fish specimens were measured to the nearest of mm using divider and measuring board. Eleven morphometric and three meristic characters were studied and relationships between the various body measurements to the standard length have been calculated. The relationship between the characters was worked out by the formula of simple linear regression equation: $Y = a + bX$.

3. RESULTS

Morphometric characters of all the fish collected during present investigation have been recorded and compared. The various body part measurements of the fish are as

Table 1
Linear regression equations coefficients for the relationship of standard length (SL) and various body parts for *Lepturacanthus savala*

Characteristics		Regression parameters		
Sr. No.	Compared with Total length (TL)	a	b	r
1	Standard length (SL)	14.081	0.984	0.96
2	Snout length (UO)	0.60	0.057	0.77
3	Head length (YJ')	2.176	0.124	0.85
4	Orbital diameter (OO')	0.528	0.010	0.55
5	Greatest pupil diameter (Eg)	0.283	0.005	0.47
6	Pre dorsal fin length (PDL)	1.175	0.905	0.82
7	Dorsal fin base length (DD)	- 0.529	0.892	0.98
8	Snout-vent length (SVL)	4.535	0.335	0.91
9	Pectoral fin length (Ph)	1.093	0.092	0.81
10	Body depth (h)	0.533	0.074	0.77

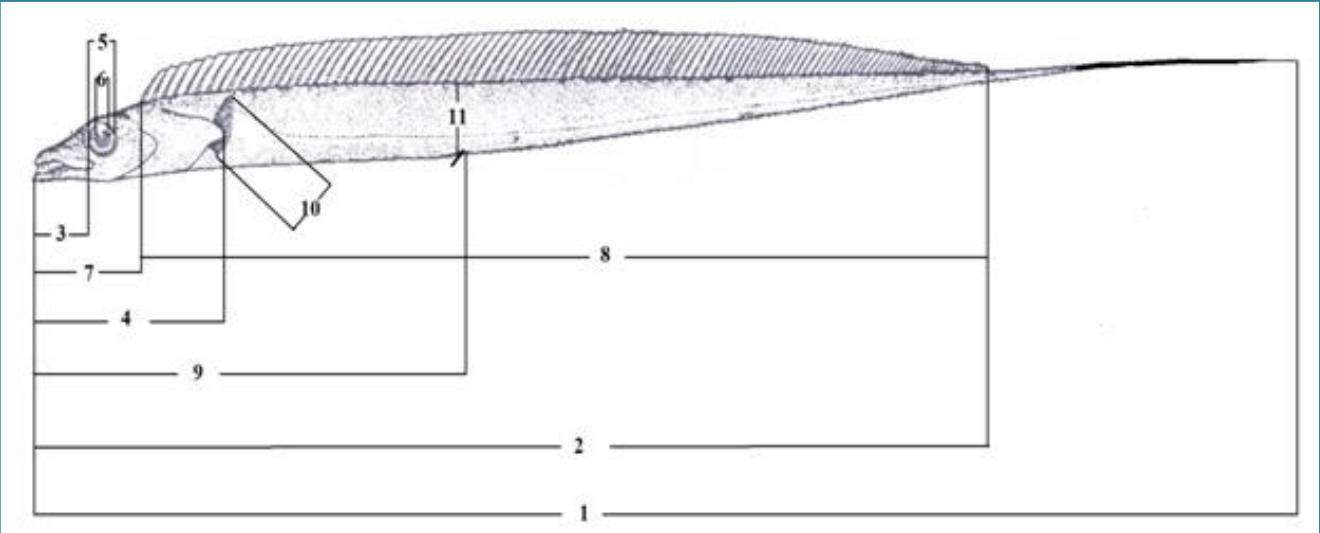


Figure 1
Morphometric characters of *L. savala*
Keys: 1. Total length (TL); 2. Standard length (SL); 3. Snout length (UO); 4. Head length (YJ'); 5. Orbital diameter (OO'); 6. Greatest pupil diameter (Eg); 7. Pre dorsal fin length (PDL); 8. Dorsal fin base length (DD); 9. Snout-vent length (SVL); 10. Pectoral fin length (Ph); 11. Body depth (h)

given in Figure 1. The pre-dorsal length 7.94 times in standard length, snout length 2.54 times in head length, snout-vent length 2.10 times in standard length, head length is 5.26 in standard length, orbital diameter 2.83 times in snout length, greatest pupil diameter 5.57 in snout length, pre dorsal length 7.94 in standard length, dorsal fin base length 1.14 times in standard length, body depth 10.97 times in standard length and pectoral fin length 7.94 times in standard length. The regression relationships between the various morphological characters with the standard length were studied (Table 1). The TL was directly proportional to the SL. The significant relationship was observed between SL and TL with value of 0.96 ($P < 0.05$) and the estimated equation was $TL = 14.081 + 0.984 SL$. The UO was directly proportional to the SL. The significant relationship was observed between UO and SL with value of 0.77 ($P < 0.05$). The estimated equation for UO on SL was $UO = 0.60 + 0.057 SL$. The YJ' was directly proportional to the SL. The significant relationship was observed between YJ' and SL with value of 0.85 ($P < 0.05$). The estimated equation for YJ' on SL was $YJ' = 2.176 + 0.124 SL$. The OO' was directly proportional to the SL. The significant relationship was observed between OO' and SL with value of 0.55 ($P < 0.05$). The estimated equation for OO' on SL was $OO' = 0.528 + 0.01 SL$. The Eg was directly proportional to the SL. The significant relationship was observed between Eg and SL with value of 0.47 ($P < 0.05$). The estimated equation for Eg on SL was $Eg = 0.283 + 0.005SL$. The PDL was directly proportional to the SL. The significant relationship was observed between PDL and SL

with value of 0.82 ($P < 0.05$). The estimated equation for PDL on SL was $PDL = 1.175 + 0.905 SL$. The DD was directly proportional to the SL. The significant relationship was observed between DD and SL with value of 0.98 ($P < 0.05$). The estimated equation for DD on SL was $DD = - 0.529 + 0.892 SL$. The SVL was directly proportional to the SL. The significant relationship was observed between SVL and SL with value of 0.91 ($P < 0.05$). The estimated equation for SVL on SL was $SVL = 4.535 + 0.335 SL$. The Ph was directly proportional to the SL. The significant relationship was observed between Ph and SL with value of 0.81 ($P < 0.05$). The estimated equation for Ph on SL was $Ph = 1.093 + 0.092 SL$. The h was directly proportional to the SL. The significant relationship was observed between h and SL with value of 0.77 ($P < 0.05$). The estimated equation for h on SL was $h = 0.533 + 0.074 SL$. The relationships are depicted in Figures 2 to 11. The meristic characters such as number of dorsal fin spine and number of pyloric caecae showed wide variation according to the size of the specimen. During present study the number of dorsal fin spine varied from 3-4 and the pyloric caecae were found from 15-16 numbers. Teeth in the main series in upper and lower jaw were 7-15. In both the upper and lower jaws, a number of smaller triangular teeth following the caniniform teeth were observed. The morphometric relationships from the collected data have been analysed using regression analysis. The high values of correlation coefficient (r^2 0.47- 0.98) obtained for various morphometric characters compared with standard length indicate high degree of interdependence of these compared characters. The regression parameters of the fish were computed and

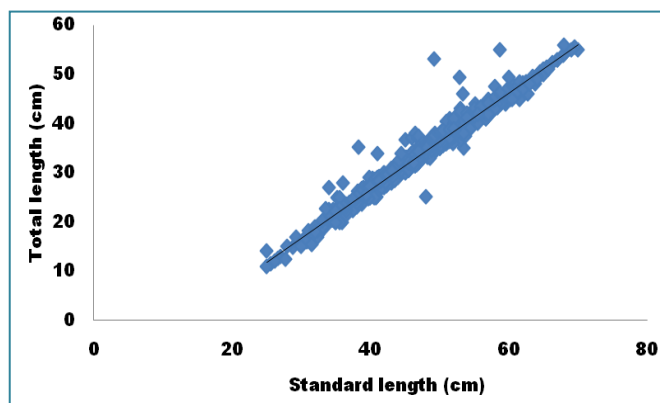


Figure 2

Relationship between standard length and total length (TL) in *L. savala* ($TL = 14.081 + 0.984 SL$)

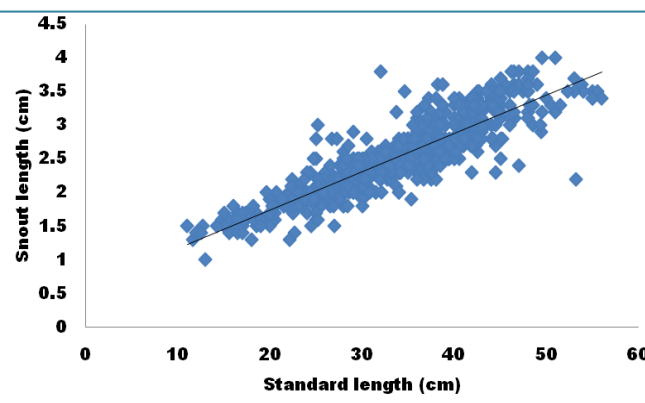


Figure 3

Relationship between standard length and snout length (UO) in *L. savala* ($UO = 0.60 + 0.057 SL$)

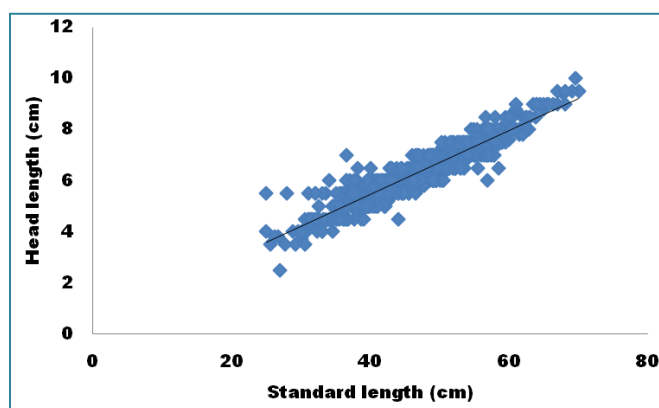


Figure 4

Relationship between standard length and head length (YJ') in *L. savala* ($YJ' = 2.176 + 0.124 SL$)

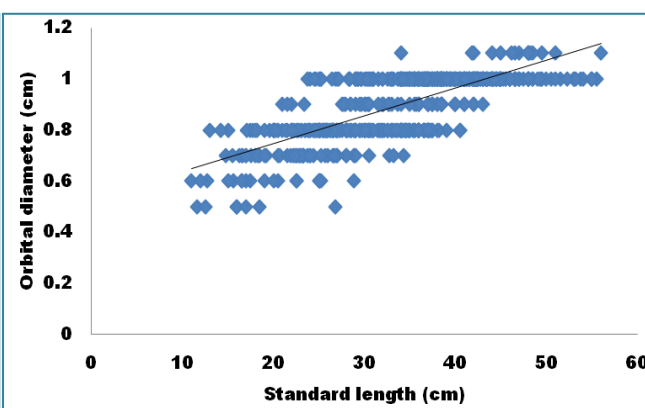


Figure 5

Relationship between standard length and eye diameter (OO') in *L. savala* ($OO' = 0.528 + 0.01 SL$)

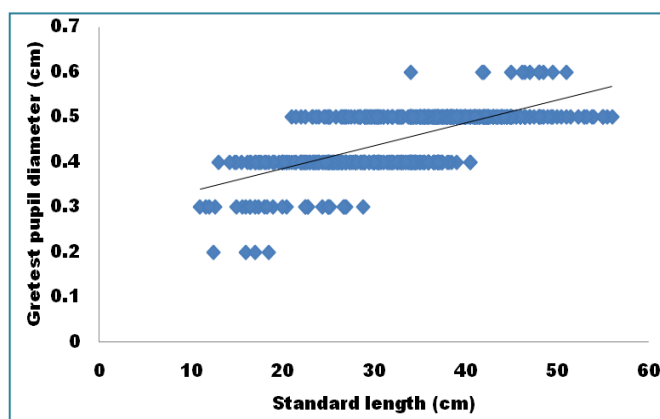


Figure 6

Relationship between standard length and greatest pupil diameter (Eg) in *L. savala* ($Eg = 0.283 + 0.005 SL$)

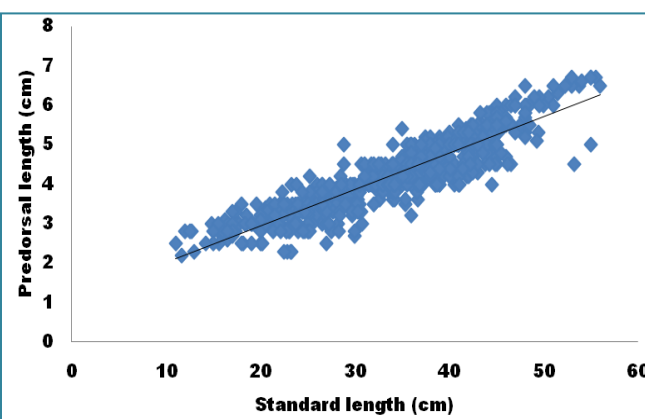


Figure 7

Relationship between standard length and pre dorsal fin length (PDL) in *L. savala* ($PDL = 1.175 + 0.905 SL$)

are given in Table 1. Relationship of various morphometric characters were compared with standard length to find out the degree of correlation. The comparative account of various relationships between different morphometric measurements have been indicated by Figures 1-10 against standard length and Table 1 indicate values of their constants (a and b) and coefficient of correlation (r).

4. DISCUSSION

In the present study, the total length of *L. savala* collected along the Ratnagiri coast ranged from 250-700 mm. The morphometric equations for the samples collected along the Ratnagiri coast were $TL = 14.081 + 0.984 SL$, $UO = 0.60 + 0.057 SL$, $YJ' = 2.176 + 0.124 SL$, $OO' = 0.528 + 0.01 SL$, $Eg = 0.283 + 0.005 SL$, $PDL = 1.175 + 0.905 SL$, $DD = -0.529 + 0.892 SL$, $SVL = 4.535 + 0.335 SL$, $Ph = 1.093 + 0.092 SL$, $h = 0.533 + 0.074 SL$. The meristic characters include dorsal fin spines may vary from 3-4 and the pyloric caecae were found in 15-16 numbers. Teeth in the main

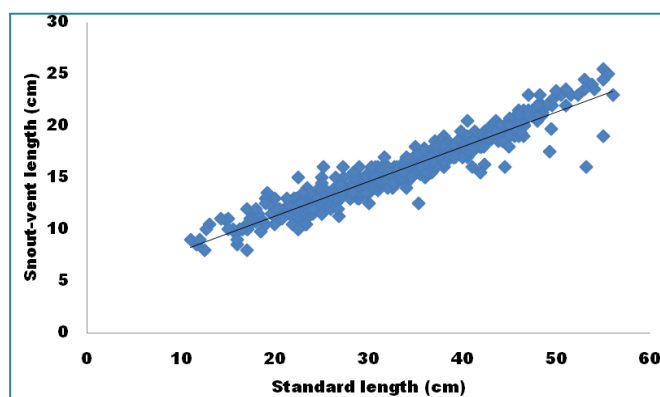


Figure 9

Relationship between standard length and snout-vent length (SVL) in *L. savala* ($SVL = 4.535 + 0.335 SL$)

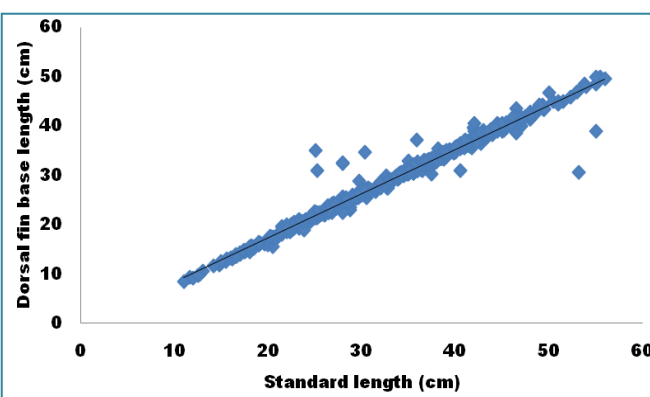


Figure 8

Relationship between standard length and dorsal fin base length (DD) in *L. savala* ($DD = -0.529 + 0.892 SL$)

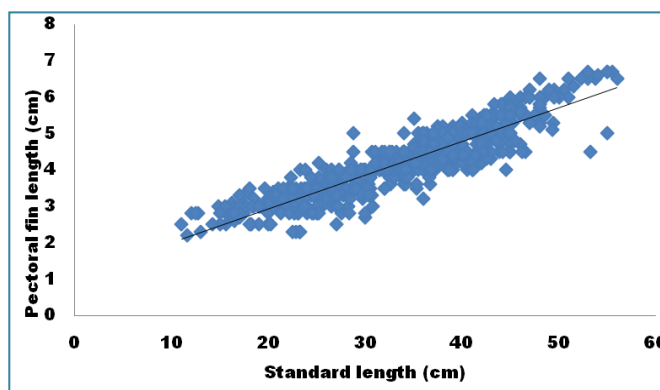


Figure 10

Relationship between standard length and pectoral fin length (Ph) in *L. savala* ($Ph = 1.093 + 0.092 SL$)

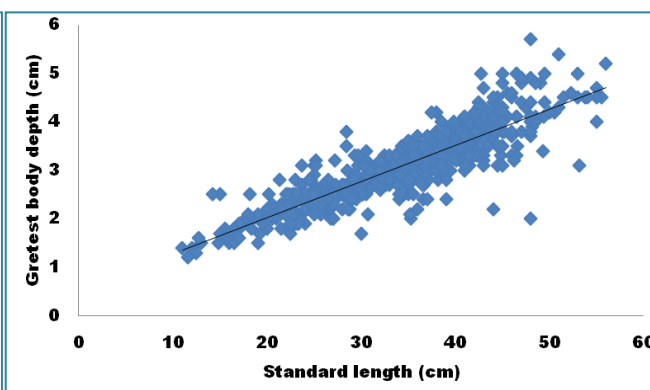


Figure 11

Relationship between standard length and greatest body depth (h) in *L. savala* ($h = 0.533 + 0.074 SL$)

series in upper and lower jaw were 7-15. In *L. savala*, teeth on the mandible are much smaller than those on premaxilla. A tendency for some of the ordinary teeth behind the fang-like teeth to develop barbs is seen only in the dentary of *L. savala*. This may be considered a secondary development since in this species, teeth on lower jaw are fewer and widely spaced when compared to other species. Lin (1936) observed, especially in a systematic study, it is advisable to compare the various body proportions with the snout-vent length rather than the standard length, since the tip of the tail of ribbon-fishes is liable to break frequently. Morphological characters are one of the very important tools in fish taxonomical studies. Various morphological characters such as snout length, snout-vent length, orbital diameter, head length, dorsal fin base length, pectoral fin length, body depth, length of lower jaw, have been used in the taxonomical identification of *L. savala* by various authors. James (1967) had used morphological characters of this fish to analyse the relationships of total, standard and weight with each other, also he observed that range of overlapping six morphometrics ratios of body proportions of *L. savala*. He reported that *L. savala* has elongated body, head 7.10-10 cm., depth 14.80-22.10 cm (14.60-56.40 cm. standard length, 3.95-19.70 cm. snout-vent length); eye 5.60-9.70 in head; D. IV, 108-123; usually a prominent spine behind the vent, anal spinules clearly break through the ventral profile of body. Lower margin of operculum was reported to be concave, partly overlapping the pectoral base and fin; lacrymal striated, fan-like, covering one third length of maxilla, ventral fins absent, caudal absent; teeth, main series, upper jaw 7-15, lower jaw 7-15; gill rakers in main series 3-13, pyloric caecae 15-16. The fin consisted of 4

anterior spines in *L. savala* followed by simple rays. It was also reported that in the upper jaw, this row of small teeth extends right from the anterior tip of premaxilla to its posterior end but in the lower jaw, the smaller conical teeth commence only behind the caniniform teeth. A few of these conical teeth at the anterior end may be directed forward whereas the following ones gradually have their tips directed backwards. The simple teeth are not located equidistantly along the jaw bone with the result that the interspaces are either bigger or smaller. Fischer et al. (1984) reported that 3 or 4 spines were present in dorsal fin. Silas et al. (1974) reported that the pyloric caecae in *L. savala* were found to be 15 – 16. Morphometric relationship of *L. savala* was studied by Silas (1974), on the basis of ratios of following parameters.

1. Vent length/Head length : 26 : 2.43;
2. Total length/Body depth : 21 : 17.77;
3. Total length/Vent length : 21 : 3.39;
4. Total length/Head length : 21 : 8.27;
5. Head length/Maxillary length : 27 : 2.29;
6. Head length/Snout-vent length : 27 : 2.58;
7. Head length/Pectoral length : 25 : 2.77;
8. Snout-vent length/Body depth : 27 : 5.25;
9. Head length/Eye diameter : 27 : 7.80;
10. Snout length/Eye diameter : 27 : 3.02.

The morphometric study of *L. savala* during the present work showed that the species found along the Ratnagiri coast was the monotypic species belonging to Family Trichiuridae, and subfamily Trichiurinae. The head length in these species falls within the same range and no allometric growth was seen with increase in total length.

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